August 1960
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Earth Science

Rockhounds' NATIONAL Magazine

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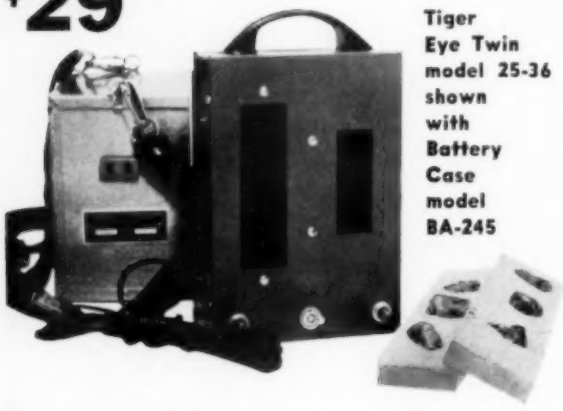

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Earth Science

Volume 13
No. 4
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Official Publication of the Midwest Federation of Mineralogical Societies.

EARTH SCIENCE PRESENTS FOR AUGUST, 1960

Cover ..... ROCKHOUND MAKES A MAP

An accurate, to scale map of the United States, a la mosaic, made by John Kurgan and entered at the Annual Competitive Exhibition of the Chicago Lapidary Society held at the Marquette Park Field House, May 20-21. Some 500 hours of labor went into its construction, and all states west of the Mississippi are made from stones native to each. More than 150 pieces were used before the map was completed. —Courtesy, Chicago Tribune

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Editor's Memo Pad

MICHIGAN SALT MINE

MICHIGAN LAPIDARY SOCIETY recently made a tour of the salt mine under Detroit. This mine, which is the second largest in the world, processes 800 tons of salt a day. Mrs. Shirly Fairchild, the society's reporter, describes the mining operations as follows: The salt is mined in rooms. First a sharp-tongued metal monster undercuts a room wall. The rear of the monster is staked down and the tongue angles out to the right and grinds its way to the left, at which point the rear is unstaked and the monster settled in a new position. It takes 40 minutes to an hour to saw a sixty-foot face. After the sawing, a gigantic multiple drill rig puts 52 holes in the face. The holes are filled with ammonium nitrate pearls which are then detonated. A drill rig is fun to watch because it has so many parts it can raise, lower, slide or waggle. Operating one must be like coaxing a dinosaur to waltz. (Ed. N.B. See page 87 June issue of EARTH SCIENCE.)

* * * *

NEW FOSSIL AREA HAS MANY "ROCKS TO CRACK"

These three words have created a minor revolution and a major new interest for the members of the Wabash Valley Mineral and Gem Society of Lafayette, Indiana.

Late last August a new booklet, "Adventures with Fossils" written by Robert H. Shaver, paleontologist of the Indiana State Geological Survey outlined specific directions as to where fossil-bearing rocks of the type found near Coal City, Illinois, could be found in Indiana. Our family immediately was eager to hunt for them and we were thrilled and amazed by what we found.

The strip mine area near Terre Haute, Indiana is very extensive covering a large part of several counties. The overburden is quite variable in nature, running from limestone to sandstone to black shale over the greater portion. Only in a limited area in southern Vigo County some fourteen miles south east of Terre Haute, does the fine grained blue shale appear in which fossil-bearing "iron-stone" nodules readily form. For that reason, the nodules have a dark gray color, rather than the rusty red of the Illinois fossils.

Both the quality and variety of the fossil forms are excellent. Since the word of this discovery was relayed to the members of our club, we have been able to collect and open some 20,000 specimens. Books on the Wilmington Coal Flora by George Langford and by Jansen are much in use, and nearly all of the types and species described have been identified in the club members' collections. In addition several animals of the Arthropod group have been found.

We feel this to be a wonderful discovery. The material is good. There is great variety and it is readily accessible. Whether this becomes a second "Wilmington Area" in importance, remains to be seen. There is no question as to the volume of material, but Indiana's law relative to levelling strip mine areas may bury millions deep within the earth. This work has already started, so it is important that interested paleobotanists and fossil collectors search the area as soon as possible. It is also possible that the machinery still in operation near by will continue to uncover more material. We certainly hope so.

Merton A. Young,
Michigantown, Ind.

LETTERS FROM OUR READERS

Kenmore, New York

Gentlemen: The new Earth Science Cover is a very definite improvement—I like it. The contents also have improved considerably in the last couple of years. I definitely enjoy each issue as it comes.

Donald A. Armstead

* * * *

Detroit, Michigan.

Dear Dr. Wilson:

I must cut down on the size of my geological library and shall have to sacrifice some rare and valuable volumes.

Among these is Owen's monumental "Geological Survey of Wisconsin, Iowa and Minnesota," published 108 years ago.

You may recall that this volume of 528 pages contains many fine illustrations of fossils which are engraved metal-ruled on steel, the first of their kind in America. Also many sketches of the landscape of our part of the world before the white man devastated it.

The volume should find a place in a library, perhaps that of one of the mineralogical societies. I would prefer that Clubs or individuals belonging to the Midwest Federation have first choice of these and other rare volumes to be disposed of, and will welcome correspondence to this end.

Sincerely,
H. P. Zuidema,
2821 East Grand Blvd.

* * * *

McMinnville, Tennessee.

Dear Mr. Wilson:

Thank you very much for sending me a copy of EARTH SCIENCE, and thank you for your interest in the NSS NEWS.

I had not realized the nature of your publication until you sent me the copy. Now that I have seen it (and enjoyed it a great deal), my one question of concern is whether or not you make it a point to stress *conservation* of caves and similar geological features in your publication? As the owner of a commercial cave, we have had considerable difficulty from "collectors" who have failed to use discrimination, and have been guilty of destroying timeless beauty.

I shall look forward to hearing from you further on this matter.

Cordially yours,
Roy A. Davis, Editor NSS News.

OUR AUTHORS

The authors of our article on Trilobites are fairly new comers to the field of Paleontology as well as to the state of Illinois. They moved here from Michigan in 1954 so that Mrs. Armstrong could attend North Central College in Naperville. Patricia received her B.A. in Biology in 1958. Also in that year the Armstrongs found their first trilobite. Since then they have spent many evenings and weekends in quarries collecting fossils. They have done a lot of research in order to properly identify them. At present they have over 30 species of trilobites. The Armstrongs are also the current leaders of the Downers Grove Juniors of the Earth Science Club of Northern Illinois.

* * * *

Louis H. Roth is an active attorney by vocation. He is married to a most understanding wife, Marian. They have two children, namely, Paul T., aged 21, and a daughter, Brenda T., aged 15. The family lives in Cambria Heights, a suburb of New York City. In his spare time Mr. Roth indulges in several avocations, "ham" radio, mineralogy, and puttering. When "hamming" he operates under the call letters W2DKH. He is a member of the Queens Mineral Society, Inc. and the New York Mineralogical Club, Inc. Mr. Roth modestly says his knowledge of fluorescence and establishment of his manufacturing firm, Radiant Ultra Violet Products, are merely the fruits of his "puttering."

* * * *

Mineralogist Magazine Changes Hands

NEW ownership of "The MINERALOGIST" has been announced in the current issue of the magazine, which has been taken over by Don MacLachlan, now editor of "Gems and Minerals" magazine, the official publication of The California Federation.

Founded in 1933 by H. C. Dake, the magazine which is the second oldest in the field, has been under the constant management of the Dake family. The publication address under the new management will be P.O. Box 808, Mentone, California.

All of us wish "Don," who is a very good scout, much success in this new business venture.

Midwest Club News

Mrs. Bernice Rexin, Club Editor

3934 N. Sherman Blvd.
Milwaukee, Wisconsin

CENTRAL IOWA MINERAL SOCIETY planned to hold its annual auction and picnic on June 3. Its auctions are not limited to rocks and the contributor of an item receives 80% of its sale price. A holding price can also be placed on each article for sale.

INDIANA GEOLOGY AND GEM SOCIETY on April 22 heard Dr. Hans DeLaROY, Metallurgist at Delco Radio, speak on "Mineral Identification by Crystal Structure." Externally many gems resemble each other, but each gem stone has its own atomic and molecular structure by which it can be positively identified. It is this structure that determines its refraction, hardness and cleavage. Dr. DeLaROY contrasted the internal structure of many gems that outwardly resembled each other, including ruby and garnet, topaz and citrine, turquoise and chrysocolla, and jade and nephrite.

KALAMAZOO GEOLOGICAL AND MINERAL SOCIETY on May 1 visited the Medusa quarry at Sylvania, Ohio, where it collected excellent trilobites, brachiopods, and one crinoid head. A field trip to Jackson, Michigan to collect plant fossils was planned for June 5.

TRI-STATE GEM AND MINERAL SOCIETY visited Ardo Keil at Bellevue, Iowa on April 24 to see his collection of over 10,000 Indian artifacts, representing all phases of Indian culture.

MUSKEGON COUNTY ROCK AND MINERAL ASSOCIATION on April 25 heard an informative talk on "Gypsum, Mica, and Feldspar," by Mrs. Patricia Sorenson. John Riley then discussed field trip safety and courtesy, and displayed field trip equipment and safety glasses.

EARTH SCIENCE CLUB OF NORTHERN ILLINOIS recently enjoyed an illustrated lecture on "Volcanos," by Clarence Smith, Professor of Geology at Aurora College. Professor Smith discussed in particular the volcanos that rim the Pacific ocean. This group is sometimes called the "ring of fire." He stated that there are many theories regarding the cause of volcanic eruptions, but the most recent one is that they are caused by excessive heat generated by radioactivity deep within the earth.

DES MOINES LAPIDARY SOCIETY'S speaker, Paul Doggett, at its April meeting took the society on a treasure hunt through North Carolina. Over 300 kinds of minerals as well as numerous fossils and artifacts are found in this state. Its gem stones include rubies, aquamarines, tourmaline and garnets. The Southern Appalachian Mineral Society has planned field trips to the state's best collecting areas as part of the convention of the Eastern Federation which it will host in Asheville, North Carolina, August 4-13, 1960.

CENTRAL MICHIGAN LAPIDARY AND MINERAL SOCIETY on April 21 heard Dr. Jane E. Smith, Professor of Paleontology and Stratigraphy at Michigan State University, speak on "Fossils of Michigan."

DES PLAINES VALLEY GEOLOGICAL SOCIETY at its April meeting enjoyed a lecture and slides program on "Yucatan, Mexico," which was presented by Raymond Taylor. The early Mayas built their temples here and profusely decorated the great stone edifices with both relief sculpture and sculpture in the round. They also used gold, silver, jade and other precious minerals for ornamentation. There is evidence, Mr. Taylor said, that the Mayan priests had knowledge of atomic power and its source.

MIAMI VALLEY MINERAL AND GEM CLUB heard a very stimulating talk on "Gemstone in Ohio." by L. H. Cole, at its March meeting. Mr. Cole admonished his audience not to say that flint is the only stone that can be polished in Ohio, but try polishing any stone that they find—they may be pleasantly surprised. Not all driveway stone is limestone and some limestone will take a polish. One of the beads sets displayed by the Smithsonian Institute at the last Midwest Show was fossilized limestone. The club was so inspired by Mr. Cole's talk that it is now planning a "Let's Explore Ohio" contest to see how many new polishing materials can be found in Ohio and to discover new ways to use already known material.

MICHIGAN MINERALOGICAL SOCIETY is raising funds to contribute to the Exhibit Museum of the University of Michigan to help defray the expenses of acquiring a complete skeleton of Allosaurus, a huge flesh eating dinosaur of the Jurassic period, which the university hopes to unearth in a proven deposit of dinosaur remains in Utah. Exploitation of this deposit is a joint project of several universities.

(*Continued on page* 147)

ROCKRAMA INSIGNIA

Above is the Official Insignia to be used to publicize sub-regional Rockramas of the Midwest Federation, and for the purpose of "keeping history straight," the original piece of art work was the inspiration of C. W. "Bud" Whitaker, an Advertising Art Designer, and active member of the Central Illinois Rockhounds, and here are the designer's thoughts behind the recently approved ROCKRAMA emblem.

He used a map of the American Continents, first because all things primarily of interest to us come from the *earth*, second so that a location for the ROCKRAMA can be spotted by the faceted stone. The white silhouette of the United States was made so—merely because this is the area in which we are interested from a standpoint of club groups. The black areas indicating foreign countries are in no way shown so from our lack of interest in them—but merely to add variation and to help show concentrations of the American Federations.

The type face in the word ROCKRAMA was chosen for its legibility in any size—large or small. The banner containing the words Midwest Federation is for both balance and to leave space below or above for the club emblem or insignia holding the ROCKRAMA. The shield outline lends dignity and continuity.

Ed. Note: We congratulate artist "Bud" Whitaker for artistic ability in producing this "Gem of an Insignia" for the Midwest Federation.

September 23-25—Midwest Sub-regional Rockrama, Decatur, Illinois. Central Illinois Rockhounds, host. (See special announcement in this issue of Earth Science).

ROCKRAMA MAKES DEBUT!!

MIDWEST history was made on May 14-15th, when the first sub-regional Rockrama was held in the St. John's High School in Jackson, Michigan, under the auspices of the Michigan Gem and Mineral Society. From every angle this was a noteworthy event which no doubt will encourage many other Societies to undertake similar shows in the future that will give the Midwest a complete complement of Rockramas annually in each of the subregions of the Federation.

As most of us already are aware, ROCKRAMA is a distinctive name to be used in the future throughout the Midwest Federation by regional shows to be sponsored by the Federation and to be held annually in each subregion, excepting that in which the Annual Convention is to be held. The real purpose of this new idea being to give all existing Clubs of the Federation the opportunity to attend and participate in at least one big event annually, without having to travel, sometimes more than a thousand miles, to a Convention. In fact about the only real difference between these shows and the Convention will be the annual election of Federation Officers and the business session that will only be held at that time.

After much study and planning the Rockrama idea was presented by Publicity and Promotion Chairman, Gus Brown of Des Moines, and officially adopted at the annual Midwest Convention held in Springfield, Ohio, last June (1959), and we are happy to learn of the splendid cooperative spirit shown by a number of clubs who participated in Midwest Rockrama No. 1. We are looking forward to an equally successful show at Rockrama No. 2 which will be held September 23-25th at Decatur, Illinois by the Central Illinois Rockhound Club of that city. A large number of exhibitors have already arranged to be there—and this show also promises to be a great success. Start planning now to attend this "Midwest Central" Sub-regional Rockrama.

"IN MEMORIAM"

Seldom have Midwest rockhound circles, including club members as well as Federation officers, been so shocked as they were upon learning of the untimely passing of their dear friend and fellow rockhound, "Gus" H. Brown, of Des Moines, on Wednesday, June 15th, at the Iowa Methodist Hospital where he had gone for observation. He had not been in his usual health for a number of weeks, suffering from a heart ailment, although his condition was not thought to have been serious.

"Gus" was an author and lecturer of note on the lapidary arts. He was first president of the Des Moines Lapidary Society; Chairman of the Geographic Boundaries Committee of the American Federation; and of the Publicity and Promotion Committee of the Midwest Federation. It might truthfully be said that no one individual in recent years has contributed more to the growth and welfare of the Midwest Federation than he and his good wife, Dency, always working as a team.

He was the originator of the V-lock mounting method now widely used, and the first to suggest the innovation of the Midwest sub-regional Rockramas which, officially adopted by the Federation, holds much of promise for the advancement of interest in our community of rockhound enthusiasts. He also was an ardent booster of Earth Science magazine and the instigator of our Art Lapidary section which has been very well received.

Born in New Hampshire in 1908, he also lived in New York, moving to Des Moines in 1946. He was a graduate of Columbia University with a B.S. degree, having specialized in chemistry and pharmacy, and was the owner and operator of the G. H. Brown Manufacturing Company, specializing in pharmaceuticals.

Surviving are his wife, Dency, his mother residing in Denton, Long Island, N.Y., and one brother and one sister. The family have suggested a memorial scholarship fund to the Des Moines Lapidary Society for the American Federation of Mineralogical and Geological Societies. "Gus" will be greatly missed in the Council of the Midwest Federation, where his pleasing personality and timely advice were greatly appreciated at all our recent meetings.

Our heartfelt sympathy is extended to Dency, and may the good Lord sustain her in her greatest sorrow.

COMING EVENTS

Important Regional Conventions

August 4-6—Eastern Federation Convention and Show. Municipal Auditorium, Asheville, North Carolina. Field trips scheduled for August 7-13, conducted by local host Society.

September 3-5—Northwest Federation, Lane County Fair Grounds, Eugene, Oregon. Held annually on the Labor Day weekend holiday.

Conventions and Shows

Oct. 22, 23, 1960—Mineralogical Society of Pennsylvania Symposium (Mineral and Gem Show) will be held at LaSalle College, Philadelphia, Pa. For further information contact J. David Dear, 1829 W. 73rd St., Philadelphia 26, Pa.

The Rib Mountain Gem and Mineral Society will hold their 3rd Annual Gem and Mineral Show at Wausau, Wisconsin, September 25th, 1:00 to 9:00 p.m. Admission free. This will give Midwest visitors an opportunity to visit famous Rib Mountain, one of the many scenic marvels of Wisconsin.

* * * *

Silver Anniversary Show of the San Francisco Gem and Mineral Society will be held at the Scottish Rite Auditorium, October 29-30. One of the most outstanding exhibits will be OUR GRANDFATHER CLOCK whose entire working mechanism is of jade, fashioned by lapidary artisans of this Society. Admission 50c.

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The Art of Fashioning Gemstones

I. The First Gems

by J. DANIEL WILLEMS

ANTIQUE GEMS. Art, that powerful word of three letters is probably the most used—and sometimes misused—expression in the English language. One dictionary lists more than a dozen situations where it can be properly applied. Another lists nine synonyms. In this article, written for the seriously interested rockhound, or gem cutter, the word Art finds application in two senses: 1) the skill and technique with which the operation of fashioning a gemstone is performed, or in other words facility and dexterity with the hands; and 2) the ability to perceive that which is beautiful, and to express in form and color the beauty of that perception. To get the greatest possible beauty into a finished stone is an art indeed.

Art is inherent in nature and finds its full expression in gemstones. It is safe to say that gemstones are recognized as the purest of all luxuries. They do not satisfy even one of the so-called animal necessities in man. On the contrary they cater to the fullest to the esthetic senses in all mankind the world over. Gemstones are not only the most enduring but also the most universally desired material possessions. Every girl wants a diamond. When she has it she wants another, a bigger and better one. And that desire is not limited to the female sex by any means. A beautiful gemstone in the proper place at the right time is always in the best of taste.

Antique Gem Cameo, "The Lion Hunt." (From Lippold, Gemmen und Kameen.)

THE FIRST "GEMS". Gemstones have great antiquity. The earliest operations by man upon gemstones go far back into history, long before books were written, or pictures were engraved and printed, perhaps even before statues were carved. Stones which were altered by ingenious men with artistic abilities have first seemed to appear in Egypt about 4000 B.C. and in Mesopotamia around 3000 B.C. From there stone cutting spread to all the rest of the then known world until it blossomed into the glorious Greek and Roman periods, where it became a great moving force in those cultures. There the great artists, architects, sculptors, lapidaries (stone cutters), and temple builders have left the world a record of culture such as has never been excelled. And the numberless gems they engraved into hard stones are even now a source of infinite delight to all those who love gems.

The materials used for the antique gems were at first some of the softer stones: shell and marble, and finally hematite became popular. But soon

these artists developed their skills to a remarkably high standard of perfection and preferred the harder, more durable stones, such as amethyst, carnelian, chalcedony, onyx, sard, lapis lazuli, and several others. These gems have been preserved in enormous numbers and are now to be seen in many of the great Museums in permanent collections. The product of these early gem engravers is exquisite in workmanship and detail. Some of the best of this work was done on very small, almost minute, gems and with such perfection that many a tiny engraved portrait gem vies with the great classical statues in dignity and nobility, although it may be less than one inch in its greatest dimension.

The first gems were engraved rather than cut. Upon a surface made smooth and prepared by the gem cutter he scratched with sharp pointed tools a design. The earliest gems produced in this manner were cylinders, the so-called cylinder seals. A piece of stone was shaped into a rod from one to three inches long which was made into a cylinder by boring out the center. Upon the surface of the cylinder the engraver placed his preconceived design. This consisted of many subjects: inscriptions, animals, heroes, fighters, battle scenes, worshippers, deities, portraits, and often the owner's name. No two engraved gems have ever been found that were exactly alike. Each one is an original work of art.

The cylinder seals of the Babylonians were carried by their proud owners on their persons, often fixed to the wrist by a fibre as an object of adornment. The same cylinder was also used for identifying property. Thus an important person such as a merchant could carry his mark of authority with him and enjoy it as we do jewelry. At the same time he could also use it to label and identify his property. Valuable cargo brought to the market places by camel caravan was discharged and the owners claimed it. Such cargo was identified by a blob of soft clay upon which the owner's seal was impressed. This prevented theft and saved the owner its cost many times over.

The earliest type of Gem, a Cylinder Seal (from Scarabs, by Newberry).

After cylinder seals crude rings were made by the Egyptians and engravings placed upon them. These tended to be more utilitarian than artistic. They served largely as seals similar to the cylinders. The next step was from ring to scarab. The scarab

was a likeness of the beetle which the Egyptians held sacred. Here, so it seems, the first gems were given a polish after they had been cut. The artists recognized that the value and desirability of the gem were thereby greatly increased.

Almost as early as the gem cutters of Mesopotamia were those of Crete and several other countries. But the greatest heights in the art arrived with the Greek and Roman development of their methods of cutting portraiture. Hard stones were now used entirely and objects of great beauty were made. Rings for the finger, necklaces of beads, pendants, ornaments of magic, and finally the large quantities of cameos, or rather intaglios, these gems of classical times became extremely popular and abundant.

"GEMS" AND "GEMSTONES". The words "Gems" and "Gemstones" as they are in general use today have quite different meanings from the words "Gems", "Antique Gems", and "Engraved Gems" as they were used before the year 1800 A.D. Gems in the older sense referred to carved or engraved stones in the harder gem materials. These carvings were made by artists of the highest calibre who were in fact accomplished sculptors and able to produce portraits on stone with striking likeness to the subject. Such gems are now referred to as Ancient Gems or Antique Gems or more commonly simply as cameos or carvings. These terms are confusing unless they are clearly kept separated and understood.

The Ancient Gems are replete with grace and beauty. The various cutters vied with each other and enormous numbers of Gems were produced. Many of these classical Gems have been gathered into collections and extensively described with words and pictures in expensively produced books. Here are shown intaglios and cameos, in single colors and multiple colors. A very large proportion of these pictures are actually portraits of famous people. Others are Deities, or figures of mythology. The workmanship of the portraits is excellent and fully equal to that of the Greek and Roman sculptors.

MODERN CAMEOS. Cameos are being cut today in considerable numbers. In the main they differ from the An-

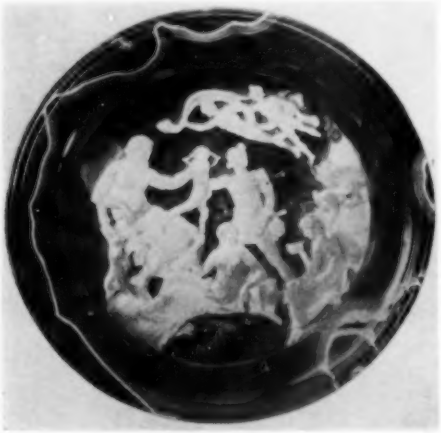
Ancient Gem Cameo in Chalcedony, from Crete. This is a full-face front view. The head is pure white. The nose, as is usual in this form, is broken. In the Author's Collection.

Ancient Gem Cameo of Neptune leaning on his Trident, engraved for printing. (From Gemmae Antiquae Caelatae, 1741.)

tique Gems in that they are cut from stones with two or more alternating colors in layers which can be cut to show cameos with contrasting colors. The Ancients were largely of one color. The colors most commonly preferred by cutters are black for a background with white for the image. Such a cameo is referred to as an onyx. And where the colors are brown or red-brown and white it is called sardonyx.

Popular above all today are the shell cameos, cut from a variety of sea shell found in the Mediterranean and its associated waters. These color layers in shell are usually white on brown or pink. Shell has a hardness of three on the scale of Mohs. It is not difficult to carve and in the cameo centers of Italy one can sit for his portrait and take it away. Exceptionally fine cameos are sometimes seen which are handpainted with extreme delicacy. Cameos are also cut from fine coral of a bright red color. The coral being soft, these gems show signs of wear and tear very promptly.

Intaglios are more appropriate for carving stone of one color. An intaglio is, practically speaking, a cameo in reverse. The cameo is cut with the image raised on the background. The intaglio is cut downward below the background. Nearly all of the Antique Gems were intaglios. Another form of carved gems not extensively used by the ancient cutters is the cuvette. In this stone a cameo is produced upon a concave background, a dished surface, so that the outer rim of the gem is higher than the image, which is higher than the background. This type does not seem to be very popular, and is used mainly as a variation of the accepted forms.



The "Tazza Farnese," a Cameo Dish in Sardonyx of several different color layers. The group depicts the Fertility of Egypt. On the left is Father Nile leaning on a tree holding the Horn of Plenty, center figure holds a bag of seed, the Goddess of Plenty is seated with her arm resting on a Sphinx, above soar the Gods of Wind and Water, on the right the Fruits of the Harvest are presented. (From Lippold, Gemmen und Kameen.)

Cameo Portrait of Alexander the Great. (From Lippold, Gemmen und Kameen.)

BOOKS ON ANTIQUE GEMS. Many books were formerly published showing thousands of examples of the glyptics, some of which are works of art in themselves. Some of these old books are very large, the paper is of finest handmade quality and the printing of the skillfully engraved metal plates showing the gems is a challenge to modern printing methods today. The amazing detail which a good cutter graves upon a stone is faithfully reproduced by the photoengraver and then printed with remarkable clearness.

AMATEUR CAMEO CUTTERS. The number of amateurs who cut gemstones, of the usually accepted types, cabochons and facet stones, is far be-

(*Continued on page* 144)

GEOLOGY ON TELEVISION

BY MRS. CAROLYN FARNSWORTH

Mrs. Carolyn Farnsworth and Mr. William Hagans appear on television discussing "Earth Science for the 6th Grade." Photo by Art Whittemore

GEOLOGY was introduced to more than five thousand 6th and 7th grade students of the Columbus Public Schools during January and February, 1960 through the medium of television. Through this program the students became acquainted with various aspects of geology, such as fossils, rocks, and minerals.

These geology presentations were part of a regularly scheduled TV program, "Science for 6th," which is broadcast from 10:45 to 11:15 a.m. every Tuesday of the school year over WOSU-TV, channel 34, as a cooperative project of the Columbus Board of Education and the Ohio State University. The Ohio Division of Geological Survey was asked to assist in the six lesson series on geology from January 5 through February 9. Mrs. Carolyn Farnsworth, geologist, appeared on the programs and discussed the various facets of geology with Mr. William Hagans, the TV classroom teacher.

The geology series was designed to supplement and enrich the 6th grade unit on "How is the Earth's Surface Changed?" The series was also planned to include as much state and local geology as possible. Members of the 7th grades were invited to participate in the series, because they were studying a unit on Ohio history and

geography. A guide on the series was sent to all 6th and 7th grade teachers so that they could, if desired, provide pre-telecast and post-telecast activities. The teachers were also given supplementary reference materials. Most of the 6th and 7th grades of the Columbus Public Schools as well as 6th and 7th grades of other school systems in the Columbus area and interested parents, watched the programs.

Mrs. Farnsworth guided the development of the various geological subjects, supplementing the discussions with samples, pictures, filmstrips, and a movie from the offices of the Ohio Geological Survey. The Department of Geology and the Department of Mineralogy of the Ohio State University also helped by providing models, filmstrips, a movie, and specimens of rocks and minerals.

The first of the six lessons was titled "Earth History." "Geology" and the "geologist" were defined. Why geology is important was emphasized by having the audience look around them and name as many rock products as possible. Then the concept of "earth history" was introduced by presenting the four major geologic time eras, the Cenozoic, Mesozoic, Paleozoic, and Pre-Cambrian, and discussing what happened to the animals and plants during each of these eras, in the world and in Ohio. Several pictures of prehistoric scenes of life were shown. The word "fossil" was introduced and a demonstration was given on how an animal becomes a fossil by using a clam shell and molding clay. The dinosaurs, illustrated by plastic models of Tyrannosaurus, Brontosaurus, and Triceratops, were one of the high points of this program.

The second lesson dealt with the changing surface of the earth, as related both to erosion and to vulcanism. Being most interesting, most of the time was devoted to vulcanism. A cutaway globe was used to show the different interior layers of the earth: crust, mantle, liquid outer core, and solid inner core. The term "magma" was defined. Vulcanism was illustrated by using a diagram showing the formation of batholith, laccolith, dike, sill, and volcano. Then a movie of Hawaiian volcanic activity provided an example of volcanic eruptions and movement of lava. This was followed by another diagram which illustrated mountain-building forces. This illustration showed in a series of block diagrams, how a sea bottom becomes a mountain top through folding and faulting.

The classes were referred to their text books for discussions on erosion by wind, water, and ice—the forces that wear down the surface of the earth.

Lesson three, "What is a Rock", was a favorite with many of the classes. The terms "igneous", "sedimentary", and "metamorphic" were explained. Diagrams and experiments were used to illustrate the ways in which rocks are formed. The following examples of the three classes of rocks were described and were shown to the audience: igneous—granite, lava, pumice, obsidian; sedimentary—conglomerate, sandstone, shale, limestone, salt, gypsum, dolomite, coal, oil; metamorphic—slate, marble, gneiss, and schist. Special emphasis was placed on the sedimentary rocks found in Ohio by mentioning where the different rocks occur and how to correctly identify them.

"What is a Mineral" was the topic of the fourth lesson. Minerals were shown to differ by color, luster, shape, and hardness. An experiment was explained on how to grow salt crystals. The following minerals were shown and described and interesting facts about each one were given: quartz, flint, calcite, halite, mica, pyrite, uranium, germanium, graphite, and gem stones. A 6th grade mineral collector, George Maher of the Columbus Rock and Mineral Society, was a guest. He brought part of his collection and pointed out his favorite minerals.

Earth resources was the theme of the fifth lesson. Some of the different ways geologists locate deposits of

(*Continued on page* 146)

NIAGARENSIS VERSUS CELEBRA

by Chuck and Pat Armstrong

AS newcomers to the fun of trilobite collecting, we were interested in identifying our specimens and confused by the use of *Calymene niagarensis* and *Calymene celebra*. Determined to find out the difference between them, we consulted all the books at our disposal, wrote letters to the Illinois and Washington, D.C. museums, and even asked our encyclopedia answering service. It seems that this is one of the greatest problems in the field, and we, as amateurs, had to bump up against it.

The genus *Calymene* has long been a rather unique one, for it seems that many of our well known trilobites such as *Phacops rana* have been classified as a *Calymene* at one time or another.[1] And all of the members of the genus as it now stands are extremely difficult to tell apart.

Since none of the books which we had on hand gave a description of the two trilobites in question, we wrote to the Smithsonian institute in Washington, D.C., and received the following reply from G. Arthur Cooper, Head Curator, Department of Geology:

> "I am sorry to say that I cannot answer your question about the difference between *Calymene niagarensis* and *C. celebra*. I do not know the latter species and without the author's name I am unable to find it."

We also wrote to the Illinois State Museum, thinking that they knew more about the Illinois trilobites than Washington, and received this answer from Carlton Condit, Curator of Geology:

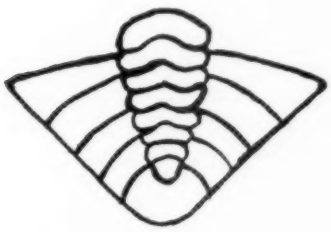
> "In regard to your query concerning the difference between *Calymene niagarensis* and *C. celebra*, it appears from the literature that the names are synonymous."

Again we found no real answers, and the literature seemed to confirm that the names were synonymous. For instance in the *Index Fossils of North America*, Shimer and Shrock say: *"Calymene celebra* is usually identified as *Calymene niagarensis."*[2] In a paper by D. J. Fisher, P. E. Raymond identifies a trilobite as *Calymene celebra* with *niagarensis* in parentheses. This indicates that they are considered to be the same thing by the author.[3]

However, Heinz A. Lowenstam in his paper lists the two trilobites independently of one another: *Calymene niagarensis* in the Racine formation and *Calymene celebra* in the Waukesha and Joliet formations.[4]

Here again were two opposing views and the solution still seemed far away. Then our encyclopedia answering service came through with quotations from unobtainable papers which

[1]Walter, Otto Theodore, *Trilobites of Iowa and Some Related Paleozoic Forms*, Iowa Geological Survey, Volume XXXI, 1923 and 1924, page 310.



C. niagarensis

C. celebra

furnished descriptions of the two trilobites and made their difference plain. However, they even confessed, after six months of work, "It has been a surprise how this apparently simple point has been most difficult to resolve."

Here, at last we had the solution. The paper which held the secret was written by P. E. Raymond and is footnoted here.[5] This is what it said about the two trilobites: *Calymene celebra*, the most common in the Chicago-area, is found in the Waukesha and Joliet formations usually and not in the Racine. The *Calymene niagarensis* is found in the Racine and rarely in the other two.

The cephalons are identical and the thoracic segments usually number 13 in both species. The pygidium of the *Calymene celebra* has only six axial segments and four pleural segments which do not go to the margin of the tail. Conversely, the *Calymene niagarensis* has eight axial segments on its pygidium and the four pleural ribs do go to the margin of the tail and are often more distinct there than close to the axial lobe (as shown on previous page).

[2]Shimer, Hervey W., and Shrock, Robert R., *Index Fossils of North America*, John Wiley and Sons, New York, p. 641.

[3]Fisher, D. J., *Geological and Mineral Resources of Joliet Quadrangle*, Bulletin no. 51, State Geological Survey, Urbana, Illinois, p. 25, figure 13.*

[4]Lowenstam, Heinz A., *Studies of Niagaran Inter-reef Formations in Northeastern Illinois*, Illinois State Museum, Vol. IV, Springfield, Ill.

[5]Raymond, P. E., *New and Old Silurian Trilobites from Southeastern Wisconsin*, Harvard Univ., Bulletin Museum Comp. Zoology 60: 3-41, 1916.

Calymene celebra (niagarensis), Raymond. Dorsal view of an internal cast of a nearly complete individual. This is by far the most common trilobite in the Joliet area.

There you have it plain and simple. Now, rock hounds, get out your Chicago-area trilobites and turn them around. Are you calling the smooth-margined *Calymene celebra Calymene niagarensis*, or are you one of the few who has his trilobites labeled correctly?

* * * *

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Agates, Anyone?

IF your searches in gravel pits are unproductive, the experts say you can make your own with the right chemicals and a couple of glass plates. Pour a thin layer of a silica gel or gelatin solution, to which a little salt and vinegar have been added, on a clear glass plate. Place a band of strong silver nitrate solution around the edge of the gel. In a few days the nitrate solution will have penetrated the gel and reacted with the salt to form white insoluble silver chloride. As supersaturation is reached, the chloride tends to precipitate in agate-like banding patterns in accordance with the theory of Liesegang rings. Colored bands may be obtained by the use of salts which form colored precipitates.

There's more to read about this phenomenon in The Agate Book by H. C. Dake, Quartz Family Minerals by Dake, Fleener and Wilson, and Lake Superior Agate by T. C. Vanasse.

THE NOVACEAN THEORY

A THEORY: Accounting for the Rise and Fall of Species. (Abstract): One of the most baffling and perplexing problems confronting paleontologists is the source of, or causative agents effecting the rise and fall of genera and species. It is a noteworthy fact that throughout every geologic age, certain genera have slowly and gradually arrived at an optimum stage of their development, then mushroomed suddenly in a great number and variety of species, many of which having extreme and exotic specialization of forms and functions. In many cases this exuberance is immediately followed by a rapid and precipitous decline leading to their early extinction, never again to appear upon the geologic scene.

In every instance these phenomena cannot wholly be accounted for, either by pre-existing climatic or environmental influences. That this is true has been recognized by students of paleontology, almost from the very beginning of the study of the subject. Citation: Elements of Geology, J. L. Comstock, 1859. Chapter III, p. 21.

"ANIMALS SUDDENLY DESTROYED; In the above history of organic remains, there is nothing to prevent the belief that the animals, whether of the sea or land, became extinct, by the ordinary means; as the decay of nature, or disease, by which slow and gradual accumulations were formed, during extended periods of time. It remains to state, that other causes seem to have operated in a few instances, and at distant intervals, to produce a rapid accumulation in certain strata, apparently accompanied by the sudden destruction, not only of the testacas, or shell animals, but also those of higher orders."

Our attention is called to this fact over and over again in the intervening literature of the past 100 years.

Our present Theory accounting for this phenomena is briefly stated as follows: In our atomic age we have learned that in many instances the infalls of radio-active particles originating from atomic explosions have in their effect by their impact upon the genes of animals had a highly deteriorating and detrimental influence, creating a wide variety of sports and throw-backs among individuals so affected.

This does not preclude the possibilities of the same effects upon the higher forms of life, including homo sapiens. In fact our greatest concern in event of total atomic warfare is the grave possibility of the eventual extinction of most higher forms of animal life upon the planet, including man himself.

Explaining similar phenomena occurring in early geologic ages, my theory is stated as follows: Astronomers have for very many years observed at somewhat frequent intervals

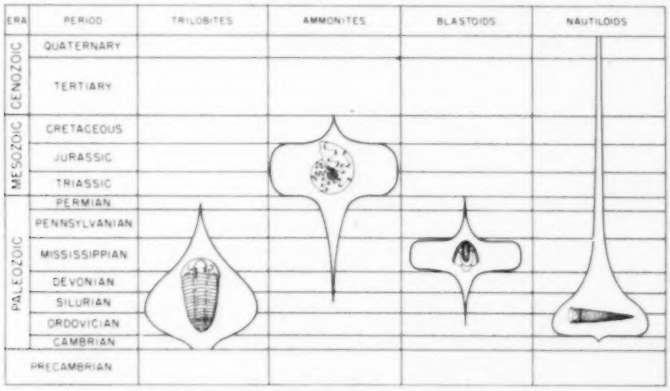

Diagram showing abundances and geologic ranges of trilobites, ammonites, blastoids, and nautiloids. *From Indiana Geological Survey, Circular No. 7, Fig. 2.*

stellar phenomena which they designate as nova (new star), some of these being of sufficient importance being classified as super-nova. These are bright starlike objects which appear suddenly in remote parts of the universe, where no star has seemed to appear previously, and after a relatively short duration they become extinct never to reappear.

These can best be accounted for as being vast hydrogen bomb-like explosions of pre-existing Suns located in distant nebula. In each such event it must be conceded that tremendous clouds of radio-active particles are created expanding out through space in every direction, with almost the speed of light.

Let us now assume that in our own siderial galaxy (the milky-way galaxy) one such explosion might occur on the average of every thousand years. There have been at least three such astro-atomic explosions known to have occurred within the past 900 years, i.e., The Crab Nebula, 1054; Tycho's Star, 1572; and Kepler's Star, 1604. It would not seem unreasonable then to assume that one such explosion (super-nova) should occur perhaps every 5 to 50 million years, in relatively close proximity to our Solar System, and that the infall of atomic radiation upon our planet Earth would be of sufficient quantity to produce the effects in question.

Even now, the infall of many particles of various kinds, foreign to our Solar System, some of which no doubt emanates from outer space, is conceded by astro-physicists, and my theory is that: The Rise and Fall of Species and Genera in past Geologic Ages are the result of the infall of radio-active particles whose source was Super-nova, occurring in sufficiently close proximity to our Solar System to become adversely effective to organic life.

BEN HUR WILSON.

Ed. Note:—First presented by the author on the occasion of a lecture given April 23rd, 1960 before the Paleontological Division of the Earth Science Club of Northern Illinois (ESCONI), at Downers Grove.

LAPIDARY WORK

By W. J. BINGHAM

This is not an article on the details of lapidary work, but rather is a check list to follow covering the fine points in producing a finely finished gem.

SAWING. The blade should run true, without bumping or binding. In trim sawing, watch out for cracks.

GRINDING. The grinding wheel should run without vibration, and be of the proper type. It also should be free of bumps and glazing, and should be provided with plenty of water. Care should be taken not to overheat or to crack the stone being worked on. The stone should be brought to its final shape and almost to its final size by this step as the next step removes practically no material.

SMOOTHING. The smoothing process is best carried out on a true running lap wheel, using silicon carbide coated cloth, with plenty of water. No cushion should be used under the cloth. Place the finer scratches at an angle to the coarser ones so that the coarser scratches can be seen as long as they are present. This is a most important step, as a good polish cannot be obtained unless the smoothing is done properly.

POLISHING: The greatest bugaboo in polishing is contamination of the polishing wheel with grit or particles of stone. Cleanliness is a *must.* Also care must be taken not to over polish.

CABOCHON MAKING. Some special things to be careful of in cabochon making are:—Make sure that the cabochon is symmetrical, both in plan and elevation; make sure the bevel around the edge is sufficient, so that it may be set properly in a mounting; and is of the correct size. A back bevel is necessary to prevent chipping while setting. A vernier caliper is much more accurate and easier to use than a template for sizing a cabochon.

GENERAL. Lighting of the workshop is very important; a concentrated light on the working area is desirable. Arrange your machinery and workbench for convenience and accessibility. Have a neat and clean workshop. A sloppy workshop invites trouble and poor workmanship.

COMMENTS. It is noted that some people have become very careless in doing their lapidary work. The beginners have an excuse in that they have not had time enough to perfect their methods of doing things. But others who

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Getting the Most Out of Your Ultraviolet Lamp

By LOUIS H. ROTH

JUST about seventy-two years ago a German scientist, Eilhardt Wiedemann, having made a thorough study of luminescence, classified this phenomenon into six categories: triboluminescence, chemiluminescence, thermoluminescence, electroluminescence, crystalloluminescence, and photoluminescence.

Most of us are familiar with triboluminescence which is described as the emission of light when crystals are rubbed or broken.

And who has not witnessed the intermittent glow of the "fire fly" on a damp early evening when he is exhibiting a form of chemiluminescence, better known as bioluminescence?

Thermoluminescence, electroluminescence and crystalloluminescence, as their respective prefixes suggest, are forms of light resulting from so-called gentle heat (below 600°C.), electric discharges, and in the formation of crystals.

Of the greatest importance and interest to us as mineralogists is our old friend, photoluminescence, more commonly known as fluorescence and phosphorescence. Briefly, fluorescence is the emission of light during the irradiation of a substance by any type of radiation provided that the emitted light ceases *immediately* when the exciting radiation is cut off. Let fluorescence persist after cut-off and we have phosphorescence. From a technical viewpoint it is alleged that fluorescence and phosphorescence are not the same, but many world-renowned scientists insist that the two are one and the same except that in phosphorescence decay (continuing luminescence) is slower than in fluorescence.

Photoluminescence can be and is excited by ordinary light rays, infra-red rays, Roentgen (X-ray) rays, gamma rays, cathode rays, and ultraviolet rays. Tests have shown that identical photoluminescence will inevitably ensue when the exciters are Roentgen, cathode, or ultraviolet rays. From a practical standpoint, it would be exceedingly dangerous to excite one's minerals with an X-ray machine. It was done in the past by researchers and scientists. It is possible that some laboratories are doing so now but for us, we'd better stick to less dangerous forms of exciters.

Your television "Picture Tube" is nothing more than a large vacuum tube which generates cathode rays. These rays, traveling at high velocity in a guided fashion, impinge themselves on a screen previously coated with a special phosphor, and photoluminescence results. Since cathode rays are in reality a form of long wave Roentgen rays, experimentation with them should be left to the scientist. The simplest and safest way to produce photoluminescence is with ultraviolet rays.

It was not always so simple or safe. Some of the "oldtimers" may recall the pioneering days when the iron arc was used to generate ultraviolet rays. Essentially this equipment was cumbersome and heavy. A very high voltage transformer delivering in the neighborhood of 8,000 volts was used along with rather large capacitors. The primary of the transformer was connected to the regular 110 volts, 60 cycle, a.c. line while the secondary, which consisted of many turns of ininsulated copper wire, was connected to two iron nails which were separated. The resultant arc or sparking between the nails then was filtered with a long wave filter. It is interesting to note that as late as 1935 the iron arc was standard equipment for the amateur as well as the professional! Other metals as well as carbon rods were used but it was found from experience that iron gave the best results.

It must not be forgotten that so-called "mercury tubes," filled with mercury, were used in some laboratories to produce ultraviolet rays. Very high

current had to be used. The glass envelopes were made of quartz tubing. Unfortunately, the glass deteriorated rapidly under the impact of the ultraviolet rays. Short life was the order of the day for the tubes of that era.

With the impact of the germicidal as well as the fluorescent tubes, cumbersome and dangerous equipment became completely unnecessary. Good results are attained with comparatively simple and relatively inexpensive tubes. Some of the current tubes are self-filtered, while others require extraneous filters.

It is a mistake to believe that the germicidal tubes (generators of short wave ultraviolet rays) were and are still marketed for the production of photoluminescence. Their use as a source of short wave ultraviolet is strictly an adaptation. We are indeed fortunate that we have a very economical source of short wave ultraviolet available because, in the destruction of bacteria, the frequencies below 2600 A.U. have been found most desirable and efficacious. To our delight and profit, a considerable number of minerals do photoluminesce below 2600 A.U.!

In so-called black light or near-ultraviolet, again the use of long wave rays, insofar as mineralogy is concerned, is strictly incidental! Commercially, near-ultraviolet rays are used in the inspection of food, in the detection of all sorts of contaminations, in the identification of all kinds of leaks, in photoreproductions, in advertising, in criminology, in medicine, just to name a bare few of their countless present and growing applications.

There is absolutely nothing mysterious about an ultraviolet lamp and it is high time that the veil is lifted. If we want far or short wave ultraviolet rays (around 2540 A.U.), a germicidal tube, a choke or ballast, a starter (automatic switch), or a special push-button type of switch, all properly connected, are capable of supplying our needs. Of course, a short wave filter is necessary to cut down the visible light generated by the tube and at the same time permit the required ultraviolet to come through. Each part has a function to perform and when all work in harmony, results are good.

To produce long wave ultraviolet (3650 A.U.), we merely substitute a different tube and filter but we retain all the other components. In fact, with the advent of the so-called self-filtered (BLB) tubes, we need but a tube and an ordinary fluorescent fixture strip to get substantial quantities of long wave ultraviolet radiations already filtered!

Most tubes now manufactured by reputable companies have a long and useful life. It is not at all uncommon for a germicidal tube to last 5,000 hours or more. Long wave tubes last somewhat longer and the several manufacturers rate them at 7,500 hours or more.

Difficulty, however, is encountered with short wave filters. Industry has not kept pace. Little improvement has been noted in the past 25 years. Short wave filters are relatively expensive and are not made in sufficient quantities to materially affect the price. Their use is strictly limited. The commercial possibilities at present do not seem to indicate an increased use. At this writing it is interesting to note that there are only two manufacturers of short wave filters in the entire world!

When one considers that the very best short wave glass filters cannot transmit more than 73% of the ultraviolet rays at 2540 A.U., it is apparent that much improvement can come from further experimentation by the manufacturers. It is important to note that a short wave filter capable of transmitting ultraviolet, as above, also transmits 70% "red" and 10% "blue". Nor is "violet" excluded. The resultant combination of "red", "blue", and "violet" causes a pronounced purplish cast to accompany the fluorescence. To obviate or disguise purplish cast, the short wave filters must be made thicker. According to Lambert's Law, when a parallel beam of radiation passes through an absorbing medium, a constant fraction of the radiation is ab-

sorbed in each unit distance of a medium traversed. Thus if, at 1 mm. in thickness, a short wave filter has a transmittance of 73% at 2540 A.U., at 2 mm. it will be almost 54%, and at 3 mm. only 40%. Correspondingly, the percentages of violet, red and blue are also cut down as the thickness of the short wave filter is increased.

It must always be remembered that purplish cast is just a man-made evil which comes from being willing to sacrifice good fluorescence for just any kind of fluorescence. In short, there must be some compromise. If the short wave filter is made too thick, very little of the desired ultraviolet will be transmitted and resort must be had to more powerful tubes and correspondingly greater expense. For the average amateur mineralogist a fairly small lamp with an average good short wave filter will fulfill his needs.

Perhaps the foregoing may explain some of the discrepancies in reports on the fluorescence of minerals. Until there is uniformity of filter thickness, precise "melding" by the glass makers, and precise surface finish, discernible colors or hues resulting in apparent fluorescence will necessarily be different. Nor can we leave out the influence of the variety in tube generators and the ballasts.

For the perfectionist the field is wide open, but whether he will ever get perfect fluorescence remains to be seen.

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(*Continued from page* 134)

yond what anyone has considered possible. The skill required was formerly acquired through a six year apprenticeship. Now it can be done practically overnight. But cutting cameos, especially portraits in stone, requires the gift of the sculptor, and many of us are not so endowed. Yet there are some amateurs who cut extremely acceptable cameos. Those individuals are to be compared to the Ancient cutters whose works of art were cut for the sake of art in the same spirit that painters paint portraits today. The cameos are now as then truly works of art and are suited only to surroundings favorable to attractive display.

There is a delightful story which goes that Alexander the Great when still a youth had a portrait cameo made of himself. He admired his own face with a slightly Narcissistic eye, noted the clean-cut lines, the sharp features, of his smooth face. He commissioned large numbers of additional portraits cut and made gifts all around. Even after maturity and a beard he shaved carefully to present his cherished image for others to admire. And thus he started the longest-lasting style in men's hairdo, which has long been thoroughly exploited by an American named Gillette. Alex not only put his clean-shaven face upon untold numbers of gems, but it promptly began to appear upon coins of the realm. Even today there are standardized stock cameos and also coins in circulation in this United States that carry a stylized portrait which is startlingly reminiscent of Alex's mug, call it the face of Liberty if you will.

CASTS IN PLASTER. Casts in plaster of Paris are frequently made of the many fine Gems in the Museums, and are available to interested persons including artists for the purpose of copying and for study. Such casts are exact and true likenesses, except as to the colors involved, and are a delight to see. Casts are also made in wax for similar purposes. They have no commercial value but are the only means by which the Ancient Gems can be distributed to all the Museums at large.

A Plaster of Paris Cast made from an Ancient Gem Cameo. In the Author's Collection.

SUMMARY. In a summary of this article the following points may be emphasized:

Gems and gemstones of whatever kind or description are works of art and thus appeal to the artistic nature of man as opposed to the purely useful or scientific interests.

With few exceptions Gems are the product of skill applied by the human hand to stones which are thereby rendered more beautiful.

Gems were first cut or otherwise worked upon more than 5000 years ago, and many of the earliest examples still survive.

The first Gems were cut or carved into stones, as against present-day methods when Gems are merely altered in form and given a high polish to improve the inherent qualities in the natural stone, but imparting to it no new or additional characteristics that were not already basic to it.

After about the year 1800 A.D. the word Gem has come to have a different meaning and is no longer limited to description of the sculptured stones. The first Gem was a carving.

Book Reviews

SO YOU WANT TO START A ROCK SHOP. Arthur E. and Lila Mae Victor. Victor Agate Shop. 1960. 52 pp. $2.00.

The Victors, who have a rock shop of their own in Spokane, Washington, like the business so well they set out to tell others how to enter it, with an engaging disregard for competition. As a matured hobby, the collecting and processing of rocks and minerals for study or just plain enjoyment, deserve a corps of middlemen who will apply the tested principles of merchandising, and thus constitute a fair market for the pick and hammer men and a stable source of supply for the collector. The Victors have performed a valuable service in spelling out the problems, risks, and rewards of the rock-selling business.

MICROSCOPIC SEDIMENTARY PETROGRAPHY. Albert V. Carozzi, Professor of Geology, University of Illinois. John Wiley & Sons, Inc. 1960. 485 pp. $11.50.

Professor Carozzi, formerly of the University of Geneva, published an earlier work in French on petrography. He combines his European approach with more recent researches in this country in the present volume.

A unique feature of the book is a presentation of what the author terms an "ideal" description of sedimentary rock-types. This has been accomplished by combining descriptions by various authorities into one "ideal" description for each specific sedimentary rock-type. By so doing he has been able to present descriptions which summarize both the most common appearances of each type along with those variations which have broad significance. His greatest contribution is in his choice and organization of the available material.

The contents are divided into three parts, Clastic Rocks, Biochemical Rocks, and Chemical Rocks. A great deal of space has been devoted to the description of the pure quartz sandstone series. The author feels this group has not received the petrographic attention comparable to the recognition of its environmental and tectonic significance. Photomicrographs and drawings based on photomicrographs are of unique value to the petrographer. Each chapter is followed by extended lists of references.

OPTICAL CRYSTALLOGRAPHY. Third Edition. Ernest E. Wahlstrom, Professor of Geology, University of Colorado. John Wiley & Sons, Inc. 1960. 356 pp. $8.50.

This book was designed as a textbook and not as a handbook or manual. However, it has many charts and diagrams which the reader will find convenient as references. The third edition has been completely re-written and is directed primarily to newcomers in the field who are interested in the theory and practice of optical crystallography. The author also kept in mind the use of this text as a review of basic theory for the more advanced readers.

No problems, laboratory exercises, or descriptive tables of minerals or crystals are included, although a new chapter on crystal rotation methods with excellent illustrations has been added. Uniaxial crystals in both plane-polarized and in convergent polarized light are studied. Biaxial crystals are studied in convergent polarized light. Optic sign determination and dispersion are also discussed.

Since many minerals and chemical compounds are now identified by optical methods, this book is an invaluable aid to geologists, mineralogists, chemists, and ceramists.

LITHOFACIES MAPS. An Atlas of the United States and Southern Canada. L. L. Sloss, E. C. Dapples, and W. C. Krumbein, Professors of Geology, Northwestern University. John Wiley & Sons, Inc. 1960. 108 pp. $5.50.

This atlas comprises 153 two-color maps compiled largely by graduate students at Northwestern University for a course in regional stratigraphic analysis directed by the three editors. The maps are presented chronologically, beginning with the Cambrian and extending through the Tertiary System. For each System a continental map is followed by regional maps. Most of the maps show clastic and sand-shale ratios in the standard triangle form. A Table of Formations following the maps lists the individual formations by state or province.

The editors comment that individual maps will necessarily vary in value because data are not now uniformly available for all areas and systems.

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rocks and minerals by field observation, seismograph, Geiger counter, and drilling were discussed. The different methods of mining were also defined (strip, open pit, and underground), and drilling both cable-tool and rotary, was explained. This program ended with a movie showing how some of Ohio's rocks and minerals are mined, processed, and used.

The sixth lesson was a review of the five previous lessons, followed by an introduction to the conservation of mineral resources. In the review, one interesting topic was picked from each lesson: (1) dinosaurs, (2) interior of the earth, (3) the 3 kinds of rocks, (4) pyrite, quartz, and flint, (5) tools of a geologist (At this point, topographic maps were introduced and suggested as a special class project), and methods of mining.

Seven ways to conserve mineral resources were then discussed: (1) prevent waste at the mine, (2) use of lower grade materials, (3) wise use, (4) substitute where possible, (5) preserve the metals by alloys, paints, and (6) stockpile.

Teachers and parents alike commented that the TV lessons on geology created a great deal of student interest. The excellent student notebooks and the many class projects indicate the enthusiasm aroused by these lessons in geology. The number of 6th grade visitors to the Ohio State University Geology Museum at Orton Hall increased during January and February. Because of these responses, geology will be presented in a 10 or 12 lesson series on television to the 7th grades of the Columbus Public Schools during the next school year.

RECOMMENDED READINGS

"Origin of Missouri Caves," by Paul Pearson. June issue of *Piasa Gems*. There are 437 listed caves in Missouri and probably more than this number not listed or unknown. These caves were formed beneath the water tables, but were carried above them when the earth was thrust upward during the great uplift in Missouri.

(*Continued from page* 127)

OMAHA MINERALOGICAL SOCIETY visited the Cedar Creek area and the South Bend quarry near Louisville, Nebr. on May 7. Trilobite pygidiums, brachiopods and a few scattered crinoid tops were found by the group.

GRAND RAPIDS MINERAL SOCIETY held its first annual show in the Grand Rapids Museum, April 10-24. The crowds admired the beautiful displays of gems, crystals and fossils, but lingered longest at the working displays where Frank Christie faceted gems, Don Casey and Joe Hanna cut and polished cabochons, and Joe Morris carved charming figures out of Petoskey stone.

MINNESOTA MINERAL CLUB on May 15 visited the Anderson Aggregate Pit near Osseo, Minn. to collect Lake Superior agates. Tumbled agates and a variety of other minerals not native to this area were also found in the pit. The mystery of these finds was cleared up when it was learned that the club had "salted" the pit so that no one would be disappointed.

FLINT ROCK, GEM AND MINERAL CLUB recently made a guided tour of the Grand Rapids Gypsum Mine. At different locations in the mine, the club was given permission to collect gypsum and needle ore (selenite.) This mine has been in operation for 100 years and the picks and hand drills of the early miners have given way to modern machinery such as automatic drills and loaders. Following the underground tour, the group visited Grand Rapids Museum where it saw a selenite crystal from the mine that measured two feet in diameter and four feet in length.

MESABI ROCK AND MINERAL CLUB has placed its club collection in the Minnesota Museum of Mining in Chisholm. The display includes local gems and minerals. The Museum also features separate displays by a number of club members and members of other Midwest Federation clubs.

On June 4-5 the club enjoyed a joint field trip with the Bloomington Mineral Club. Local dumps were visited and many fine Lake Superior agates were found.

ST. LOUIS MINERAL AND GEM SOCIETY at its May meeting heard Mrs. Anita Keaney of Mena, Arkansas, talk on "Mexican Gems and Minerals."

It reports that its member, Ken Gibbons, recently received a letter from Japan that was simply addressed: Ken Gibbons, Champion of Hunters of Diamonds, St. Louis, Mo.

WISCONSIN GEOLOGICAL SOCIETY on May 9 heard Dr. Frank Fleener, co-author of "Quartz Family Minerals," speak on "Petrified Wood." Petrification of wood, Dr. Fleener said, can occur only when it is sealed off from oxygen, otherwise it decays, leaving only a trace of black carbon in the soil. Volcanic ash, cooling lava and mud are three substances that are known to have covered trees millenniums ago, sealing them off from the air and thus allowing them to slowly change into stone. The commonly accepted theory of petrification is that as a molecule of wood decays or is dissolved, it is replaced by a molecule of silica or other mineral. Petrified logs that show no internal structure are merely casts formed when the wood rotted out leaving a mold which was filled with silica or other material. They are of little value to the paleobotanist, but are highly prized by lapidists because of the clearness of the material.

NEBRASKA GEM AND MINERAL SOCIETY at its March meeting constructively criticized displays of its members in the hope that the criticisms would improve future show displays. A case of petrified wood was voted as nice, but would be improved if less material was included and the opinion on a case of jewelry was that pyrite jewelry, faceted stones and cabochons should not be shown as a single display, but exhibited separately.

MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY'S member, Dan Printup, presented its May 20th program, "An Introduction to the Prehistoric Indians of the Mississippi Valley." The program, which was well illustrated with colored slides, was based on original research by Mr. Printup.

TRI-COUNTY ROCKS AND MINERALS SOCIETY'S scheduled field trip for May to the Maybee quarry had to be cancelled when it was learned that the quarry was closed to collectors because some collectors had disobeyed the rules of good conduct while visiting the quarry.

ILLOWA GEM AND MINERAL SOCIETY last winter planned an eight-week adult education course in the earth sciences for the Davenport High School. The course was so popular that many persons had to be turned away and the school board has voted to make it a regular part of its adult education program. Both the materials used in the course and its teachers (members of the staff of Augustana College) were provided by the society.

(*Continued from page* 145)

FOSSILS: Prehistoric Animals in Hoosier Rocks. T. G. Perry. Indiana Department of Conservation. Geological Survey. Bloomington, Indiana. 85pp. 40c postpaid.

An exceptionally informative booklet, treating the paleontological history of the State of Indiana, being Circular No. 7, published under the auspices of the Publication Program Committee of the State Geological Survey.

While the text material is not exactly elementary, technically the subject matter is treated on a median plane, quite readable and understandable by even those who have had no special training in this branch of geology.

An introduction dealing with the Principles of Paleontology, is followed by good information concerning collecting, preserving and labeling of fossils, geologic time, and the matter of the evolving forms of animal life. Handled in the next section is descriptive material of the various and more common forms, together with a large number of excellent illustrations, with an extensive Bibliography at the close.

* * * *

INVERTEBRATE PALEONTOLOGY. William H. Easton, Professor of Geology, University of Southern California. Harper & Brothers (Geoscience Series). 1960. 701 pp. $10.

Paleontology is the study of all ancient animal life, extinct species as well as those which have survived. About 1,135,000 separate species have been identified in the animal kingdom. Of these about 130,000 are now extinct. Casualties have been heavy in the cephalapods, mollusca, and echinodermata; comparatively light in insecta, which comprise nearly 67% of all animal species.

Professor Easton carefully sets the stage for the exposition of his chosen subject by relating it to the allied sciences of geology (particularly stratigraphy), zoology, and biology. Fossils, which the author defines as skeletal material or impressions of skeletal materials in sediments, are the major bases for recognizing units of time in the geologic record. The proper concept of time is probably the most valuable contribution which paleontology offers to physical geology and to biology. It is an indispensable complement to zoology because it offers a means of observing the succession of forms, for which time is

insufficiently available to a zoologist studying living creatures.

Collection of fossils is followed by all-important classification for which a system of nomenclature has had to be developed. The author explains this in a neat little table in which he traces John Jones (Social Security No. —), Brachiopod Museum Specimen No. —), and motor car (No. —) back through their corresponding horizontal taxa to the Kingdoms of Animalia in the case of the first two, and to Machines in the case of the third. To facilitate students' grasp of nomenclature, the author favors increased standardization of the endings for names of taxonomic categories. The text material is presented progressively from Phylum I Protoza through Phylum XIV Unattached Echinoderma. Each chapter is followed by a bibliography and list of questions designed to play down the importance of memorizing names and terms and to magnify the significance of the data. The index and the drawings which accompany nearly every page are invaluable in a book of this kind.

Scientific authors normally feel some indebtedness to their predecessors and collaborators. Professor Easton expresses his with engaging grace and sincerity.

* * * *

THE GEOLOGICAL EVOLUTION OF NORTH AMERICA. Thomas H. Clark, Logan Professor of Paleontology, McGill University, and Colin W. Stearn, Associate Professor of Geology, McGill University. The Ronald Press Company. 1960. 434 pp. $7.50.

The McGill professors took a long backward look before writing this book. The geological history of North America goes back over 500 million years into pre-Cambrian times. Pre-Cambrian rocks form the nucleus of our continent, around which younger sediments were laid down and geosynclines and mountain systems developed.

Man's insatiable curiosity, not less than hope for a key to the earth's riches, has accumulated an incomplete body of observations and theories from which the authors have evolved their history. One of the aids to the interpretation of sedimentary rocks, which are the most prolific source of geological information, is the principle of uniformitarianism, i.e. the processes we see at work on the crust of the earth today are sufficient to account for all the events of the past that have formed the crust.

The authors consider the geosynclinal theory one of the great unifying principles of geology. The sub-title of the book is "A Regional Approach to Historical Geology." The first two regions described are the Appalachian Geosyncline and the Cordilleran Geosyncline. The third is the Continental Nucleus (Canadian Shield). The studies of fauna and flora are outlined in a separate and final section of the book. This treatment was preferred because links between the evolution of animal and plant life and the evolution of geological structures are difficult to demonstrate and also because it is pedagogically more satisfactory. A simplified classification of plants and animals at the end of the section is an excellent feature of the book.

It is natural to compare this book with "The Evolution of North America" by the U.S. geologist, Dr. Philip B. King, which was published last year and reviewed in the October 1959 issue of EARTH SCIENCE. Both are regional studies made possible by wide knowledge and experience. Dr. King's order of presentation is different; he begins with the Canadian Shield and ends with the Cordilleras. The McGill authors devote more space to the Arctic Islands and probably to the Niagara and Great Lakes region while Dr. King ranges farther south. Probably the greatest difference is that Dr. King has omitted fossils almost entirely from the scope of his book while Drs. Clark and Stearn have devoted nearly a third of theirs to the evolution of life as revealed by the study of fossils in relation to the geologic periods.

(*Continued from page* 140)

have been at it for years, have not improved their work in all that time; because they are either lazy, or they do not care, or they have poor equipment, or they have poor eyesight and cannot see their mistakes. These things can be overcome by a little effort plus the will to do so. A piece of lapidary work is something permanent and which will be in existence long after the originator is dead and buried. It only takes a little more time and effort to produce a nicely finished piece of work instead of a poor one. It is also worth while in not having to apologize for it every time it is shown.

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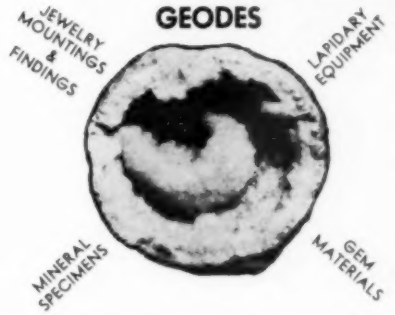

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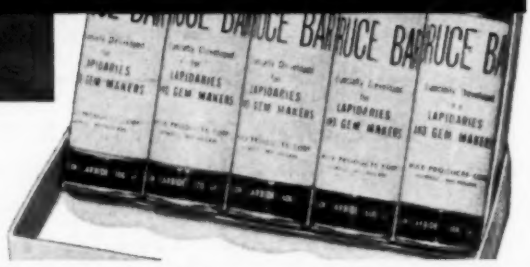

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